

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY


(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 53.91.82154/01		<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	
International application No. PCT/EP2004/010639	International filing date (day/month/year) 22.09.2004	Priority date (day/month/year) 23.09.2003	
International Patent Classification (IPC) or national classification and IPC H02J3/14, G05F1/66			
Applicant RESPONSIVELOAD LTD. et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 3 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  29.03.2005		Date of completion of this report  01.09.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer  Hurtado-Albir, J  Telephone No. +49 89 2399-2266	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/EP2004/010639

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

**Description, Pages**

1-29 as originally filed

**Claims, Numbers**

1-7 filed with the demand

**Drawings, Sheets**

1/2, 2/2 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
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International application No.  
PCT/EP2004/010639

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-7
	No: Claims	
Inventive step (IS)	Yes: Claims	1-7
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-7
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following document:

D1: GB-A-2 361 118 (RESPONSIVE LOAD LTD) 10 October 2001 (2001-10-10)

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (abstract and accompanying figure) a responsive load device adapted to be connected to an electric load which consumes intermittent or variable electric energy to maintain a variable between upper and lower limits of the variable, the upper and lower limits of the variable being derived from and defined around a setpoint of the variable, the apparatus comprising: means for receiving an input indicative of the frequency of the mains power supplied to the load from a grid; and means responsive thereto to determine a level of stress under which the grid is operating and to control power consumption by said load in accordance with the determined stress level. and to prevent the setpoint being increased when a generation shortage grid stress level exceeds a first maximum threshold value and/or being decreased when a demand shortage grid stress level is below a first minimum threshold value

The subject-matter of claim 1 differs from this known responsive load in that the means responsive thereto to determine a level of stress under which the grid is operating act as well prevent the setpoint being increased when a generation shortage grid stress level exceeds a first maximum threshold value and/or being decreased when a demand shortage grid stress level is below a first minimum threshold value.

**The subject-matter of claim 1 is therefore new (Article 33(2) PCT).**

The problem to be solved by the present invention may be regarded as how to improve the grid stability.

**The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:**

The solution offered by the present invention is to prevent the setpoint of the load being increased when a generation shortage grid stress level exceeds a first maximum threshold value and/or prevent the setpoint being decreased when a demand shortage grid stress level is below a first minimum threshold value.

In D1, one of the loads foreseen are refrigerators. The refrigerators of the prior art will have a setpoint of the temperature, which is a target average temperature for the refrigerator. In the prior art, limits will be defined around this setpoint in order to maintain the temperature of the refrigerator within the limits.

DI offers a solution to this problem by switching an electric load on or off depending upon the frequency of the mains received at the electric load and a variable associated with the load. For example, in the case of a refrigerator, provided its temperature is within certain limits, the activation or deactivation of the motor of the refrigerator is delayed during times of either too high a frequency of the mains or too low a frequency of the mains.

The prevention of increasing or decreasing of this setpoint of the variable is nowhere disclosed or suggested in D1. This prevention of decreasing or increasing of the setpoint serves to stabilise the grid in a way not disclosed in D1. A skilled person in attempting to improve grid stability would not consider adapting the teachings of D1 in order to prevent adjustment of the setpoints. There is no hint in any of the prior art documents for such an adaptation and such an adaptation would not be obvious to the skilled person from the common general knowledge in the field.

Same could be said mutatis mutandis about independent method claim 5.

**Claims 2-4** in one hand, **and 6 and 7** on the other hand, are dependent respectively on claims 1 and 5 and as such **also meet the requirements of the PCT with respect to novelty and inventive step.**

The industrial applicability of the invention is out of doubt.

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## CLAIMS

1. A responsive load device adapted to be connected to an electric load which consumes intermittent or variable  
5 electric energy to maintain a variable between upper and lower limits of the variable, the upper and lower limits of the variable being derived from and defined around a setpoint of the variable, the apparatus comprising:

means for receiving an input indicative of the  
10 frequency of the mains power supplied to the load from a grid; and

means responsive thereto to determine a level of stress under which the grid is operating and to control power consumption by said load in accordance with the  
15 determined stress level and to prevent the setpoint being increased when a generation shortage grid stress level exceeds a first maximum threshold value and/or being decreased when a demand shortage grid stress level is below a first minimum threshold value.

20 2. The device of claim 1, wherein the device is responsive to the system generation shortage grid stress level exceeding a second maximum threshold value, higher than the first, to prevent the load consuming power.

25 3. The device of claim 1 or 2, wherein the device is responsive to the demand shortage grid stress level being below a second minimum threshold value, lower than the first, to increase the power consumption of the load  
30 to a maximum.

4. The device of any preceding claim, further comprising:

responsive load control apparatus adapted to be  
35 connected to the electric load which consumes intermittent or variable electric energy in order to

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maintain a variable within the controlled upper and lower limits;

means for controlling the power consumed by the load in response to the frequency of the mains power supplied to the system and the value of said variable;  
5 means for detecting the frequency of mains power supplied to the electric load and means for detecting the value of the variable of said load; means for determining the level of instantaneous stress on the grid based on the detected frequency; and wherein said  
10 means for controlling the power consumed comprises:

means for comparing the detected instantaneous stress level with predetermined upper and lower instantaneous stress level thresholds,  
15 means for comparing said variable with predetermined upper and lower thresholds,

means for switching of f or reducing power supply to the load when said system instantaneous stress level drops below said lower instantaneous stress level limit  
20 and said variable is within the range defined by the upper and lower thresholds, and

means for switching on or increasing power supplied to the load when said instantaneous stress level is above the upper instantaneous stress level limit and  
25 said variable is within the range defined by the upper and lower thresholds; and further comprising:

means adapted to automatically optimise or adjust the predetermined threshold values.

30 5. A method for controlling an electric load which receives electrical power from a grid, said electric load consuming intermittent or variable electric energy to maintain a variable between upper and lower limits of the variable, wherein the upper and lower limits are  
35 derived from and defined around a setpoint of the variable, said method comprising the steps of:

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determining a stress level of the grid from a frequency of the electrical power received by the electric load; and

- 5 preventing an increase of the setpoint when the determined stress level exceeds the predetermined maximum threshold and/or preventing a decrease of the setpoint when the determined stress level falls below the predetermined minimum threshold.

- 10 6. The method of claim 5, further comprising the step of:

preventing the electric load from consuming power when the stress level of the grid exceeds a second maximum threshold, greater than the first.

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7. The method of claim 5 or 6, further comprising the step of:

maximising the power consumed by the electric load when the determined stress level of the grid falls below a second minimum threshold, less than the first.

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